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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/692,755	10/27/2003	Rusi P. Taleyarkhan	S-96,722	8847

31974 7590 09/27/2005

UNITED STATES DEPARTMENT OF ENERGY
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WASHINGTON, DC 20585-0162

EXAMINER

PALABRICA, RICARDO J

ART UNIT	PAPER NUMBER
3663	

DATE MAILED: 09/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/692,755

Applicant(s)

TALEYARKHAN ET AL.

Examiner

Rick Palabrica

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– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) 1-21 and 26 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 22-25 and 27-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 10/27/03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. Applicant's election with traverse of invention II (process for producing nuclear fusion), species G, and species I, in the reply filed on 7/12/05 is acknowledged. The traversal is on the ground(s) that the generic claim is allegedly patentable and therefore all species are patentable under the same patent. This is not found persuasive because Applicant's argument does not address the issue of distinctness of the claimed species, which the Examiner has cited as basis for the restriction requirement in the 6/21/05 Office action. Also, Applicant has neither admitted on record that the species are not patentably distinct nor submitted evidence or identify such evidence now of record showing the species to be obvious variants.

The requirement is still deemed proper and is therefore made FINAL.

2. Based on Applicant's election, claims 22-25 and 27-33 read on the elected invention. Claims 1-21 and 26 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. An action on the merits of claims 22-25 and 27-33 follows.

Specification

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

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3. The abstract of the disclosure is objected to because: a) it is directed to both elected invention, i.e., Group II (process) and the non-elected invention, i.e., Group I (Apparatus). Correction is required. See MPEP § 608.01(b).

4. The specification is objected to under 35 U.S.C. 112, first paragraph, as failing to provide an adequate written description of the invention and as failing to adequately teach how to make and/or use the invention, i.e. failing to provide an enabling disclosure.

There is no reputable evidence of record to support any allegations or claims that the invention is capable of operating as indicated in the specification, that any allegations or claims of imploding a bubble that results in temperature sufficient to induce nuclear fusion reaction in a liquid or its vapor.

The invention is directed to the process of producing nuclear fusion utilizing a cavitation nuclear reactor. The alleged nuclear fusion reactions are caused by the formation and collapse of bubbles by acoustic energy in a liquid. This formation and collapse of bubbles by acoustic energy is more commonly known as "sonoluminescence", "sonofusion", "acoustic inertial confinement fusion", or "sonochemistry".

The concept of sonoluminescence is nothing new to the scientific community. Sonoluminescence was discovered in the early 1930's by German scientists trying to speed up the photography development process. The scientists noticed that by vibrating the photo development fluid at frequencies higher than the human ear could

hear a faint glow was emitted. Upon further inspection of the film plates the scientists discovered spotting on the development plates caused by the light generated as a result of the induced frequency in the development fluid. See Wilson, "Hot Sounds", Popular Mechanics, 2/1998.

It was not until the early 1990's that sonoluminescence again surfaced in the scientific community. Scientists such as Seth Putterman and William C. Moss have stated their belief that the light generated during sonoluminescence is in the ultraviolet portion of the light spectrum. Ultraviolet light corresponds to a photon energy level of six electron volts, which is equivalent to a temperature of 72,000 °K, or 130,000 °F. Such temperatures are below the 4,000,000 °F necessary to achieve nuclear fusion. However, both Putterman and Moss believe that sonoluminescence is a viable vehicle for nuclear fusion. See for instance, Putterman, "Sonoluminescence: Sound into Light" Scientific American, 2/1995; Putterman et al (5,659,173); and Moss et al, "Hydrodynamic Situations of Bubble Collapse and Picosecond Sonoluminescence", Phys. Fluids, Vol. 6, No. 9, 9/1994.

The allegation or claim of nuclear reactions and associated reaction products from a forced bubble fusion reactor is questioned. Note Browne, The New York Times, 12/1994 and "Star in a Jar", Popular Science, 12/1998.

While applicant theorizes that his cavitation system according to the claimed invention can initiate nuclear fusion reactions (e.g. see page 4+ of the specification) there is no reputable evidence of record showing that the alleged evidence of nuclear fusion, e.g., generation of tritium and/or neutrons (e.g. see page 7+ of the specification)

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could not actually be the result of non-nuclear (e.g., chemical) reactions or some other unknown phenomenon. Accordingly, the cavitation method for inducing nuclear reactions by bubble generation and subsequent implosion referred to in applicants specification (see page 1+), must be the result of a variation of cold nuclear fusion reactions. This statement is based on the fact that no indication, other than speculation, of the actual temperatures needed to achieve the nuclear reaction or the alleged generation of neutrons or tritium are provided by applicant.

Doubts have been raised by the scientific community on the generation of nuclear fusion by collapse of cavitation bubble (also referred to as "sonofusion", "acoustic ICF", "sonoluminescence", etc.). Some examples are given below.

L.Crum, in his paper, "Sonoluminescence and Acoustic Inertial Confinement Fusion" presented at the "Fifth International Symposium on Cavitation," Osaka, Japan, Nov. 1-4, 2003, reports the following issues:

- The temperature required for significant D-D fusion is in the order of 100 million degrees. Temperature within a sonoluminescing bubble did not exceed a few tens of thousands of degrees. See page 1, col. 2, 2nd paragraph).
- Seth Putterman, proponent for Acoustic ICF, reports he has been unsuccessful in detecting any neutrons that were coincident with sonoluminescence during cavitation collapse. See page 2, col. 1, 3rd full paragraph).
- Ken Suslick, University of Illinois, noted that atomic and molecular dissociation and ionization were difficult barriers to breach because they required lots of energy, indication that several liquids would not be suitable for generating acoustic ICF. He further indicated that the role of vapor in preventing the heating of fusion plasma must be carefully considered. Based on his own data using a variety of molecular liquids, he suggested that temperatures of only 7,000-10,000degerees are much more likely, contrary to the claims of temperature in the millions of degrees. See page 2, col. 2, 2nd paragraph.
- D. Shapira and M. Saltmarsh, Oak Ridge National Laboratory, failed to reproduce the results of Taleyarkhan experiment to produce thermonuclear fusion from cavitating bubbles. The duo, using a different neutron-gamma

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detection system found that the excess neutrons they detected with cavitation on (versus cavitation off) were lower than one would expect from the reported tritium data by Taleyarkhan. Shapira pointed out that the "excess" neutrons attributed by Taleyarkhan to acoustic ICF probably came from the pulsed neutron generator used in the Taleyarkhan experiment. See page 3, col. 1, 2nd paragraph.

I. Sample, "The Guardian", March 2004, reports in the article, "Science runs into trouble with bubbles" that:

- Reviewers of Taleyarkhan's paper on his experiment dismissed the claim of tritium production on the ground that his laboratory was probably contaminated by that element.
- In June 2003, Taleyarkhan took the results of this experiment on sonofusion to a government meeting in Arlington to share them with other scientists in the field but succeeded only in reigniting the controversy. He showed, once again, that he had created a star in a jar.

Gordon Pusch (<http://www/physics-talk.com/Why-is-acetone-used-in-sonofusion-experiments-6987552.html>) writes the following observations:

- On the issue of how Taleyarkhan would infer that his apparatus is generating millions of K, Pusch indicates that critics of the "hydrodynamic" computer model of the bubble implosion argue that the model neglects the physical limitations imposed by molecular dynamics degrees of freedom.
- As to the tritium detected in the chamber, Pusch thinks that it might have been produced by neutron capture on deuterium, since the chamber was "degassed" by acoustically cavitating it under neutron bombardment for approx. 2 hours before experimental runs were performed.

Akiro Takahashi, Osaka University (<http://wwwcf.elc.iwate-u.ac.jp/jcf/mlist/00042.html>) provides the following information:

- Culham in Oxford, England, has scrapped its own research into sonoluminescence and other low-tech forms of fusion after a report from Thornton Greenland, a former senior scientist, suggesting it was unlikely to work.

The Chemistry and Industry News (21 April 1997) reports that Andrea Prosperetti, Johns Hopkins University suggests/comments that:

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- Sonoluminescence results from a tiny jet of liquid that shoots across the inside of the bubble, and because of the complex interplay between the buoyancy of the bubble and the sound field, the fluid is forced to push out a finger of water from the bubble's surface, i.e., "hammer of water."
- Bubble temperatures in sonoluminescence would peak at 10,000 °F, which is enough to explain chemical activity, but far below the amount needed to produce nuclear fusion.

Nuclear News, in its September 2002 article, "Chemistry casts doubt on bubble fusion", has the following statement:

- Scientists at the University of Illinois at Urbana-Champaign (UIUC) have determined that fusion is unlikely to occur in volatile liquids such as water or acetone, which was used in the original bubble experiment.

(Examiner's note: Applicant's claimed invention uses deuterated acetone as working liquid (e.g., see claim 33))

Applicant's invention is considered to be nothing more than a variation of the "cold fusion" system/concept set forth by Fleischmann and Pons (see the 3/24/89 article by D. Braaten). Note further, that merely proposing a new or different theory to account for the alleged production of nuclear reaction products does not change such systems into non-cold fusion systems.

As set forth more fully below, this concept of producing nuclear fusion from cavitation of bubbles is still no more than just an unproven concept.

Many laboratories have attempted to confirm nuclear reactions taking place during sonoluminescence. The results of these attempts at confirmation have been primarily negative (see for example, Kaiser, "Inferno in a Bubble Turning sound into light poses a tantalizing puzzle" Science News, Vol. 147, 4/1995).

Even Moss a proponent of nuclear fusion by sonoluminescence admits that the physics is not understood and that careful experimentation is required. It is also a general consensus by those skilled in the art and working at various laboratories that there is no reputable evidence of neutron, gamma ray, tritium or helium production to support the allegation or claim that nuclear reactions are taking place, nor is there any reputable evidence to support the allegation or claim of excess heat production. See for example (see for example, Kaiser and "Star in a Jar", Popular Science, 12/1998.

Moss further asserts that even if nuclear fusion by sonoluminescence is possible it will not be capable of use as an energy source. To quote, "If I were to tile the world with these SL devices, throw all the people off to make more room, and they generated thermonuclear fusion for 1 hour, all the energy put together would be enough to heat a cup of water one degree.". See "Star in a Jar", Popular Science, 12/1998.

Applicant's specification contains assumptions and speculation as to how and in what manner, his invention will operate (see specification page 1+). Indeed, applicant appears to be basing the operativeness of his invention on various approximations, estimations, assumptions, etc., of the specification. It can be said that one could manipulate any number of approximations, estimations and assumptions to come up with a result which would allegedly "work" in theory. However, applicant has presented no reputable factual evidence to support his assumptions and speculation, that his invention is operative. Without reputable evidence to the contrary, the accepted scientific community theory is presumed correct (i.e., no nuclear reactions are taking place). The disclosure is insufficient in failing to set forth the underlying assumptions for

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applicants theory as well as applicants appraisal of the degree of validity of said assumptions.

The specification appears to refer to tests and experiments wherein nuclear reaction products, e.g., tritium and neutrons, have been produced (see pages 62+) . However, these indications or allegations are not sufficient to overcome the numerous teachings by skilled artisans, (set forth above by the examiner) that the allegations of the obtainment of said nuclear reactions or products in such a system are not reproducible or even obtainable. It is not clear from the information set forth in the specification, that when all possible sources of error are taken into account, that the applicant would still be able to show positive results or that the alleged positive results do not fall within the limits of experimental error or, that the alleged positive results are no more than a misinterpretation of experimental data. For example, since applicant's invention is closely related to or a variation of the concept of "cold fusion" a study in the source of errors in such systems is appropriate and applicable (see for example Browne, Kreysa et al, Lewis et al, Hilts, Horanyi, Ohashi et al, MisKelly et al, Stipp or Chapline).

It is not seen wherein the specification discloses any particular structure, etc., which is unique to applicants' system and which makes applicants system operative whereas the systems disclosed in the above referenced "numerous teachings by skilled artisans", are not operative.

While applicant may have set forth theoretical concepts, it is well known in the nuclear field that theory and reality have a habit of not coinciding. There is no evidence

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to indicate applicant has so succeeded where others have failed, in arriving at an operative sonoluminescent system, i.e. that he has progressed his system beyond the point of an unproven theory or concept which still requires an undue amount of experimentation to enable the artisan to make and use the inventive system for its indicated purpose. To reiterate briefly, the examiner has presented evidence, that nuclear reaction and associated reaction products, can reasonably be expected to be reproducible or even obtainable with the present invention.

There is no reputable evidence of record that would overcome the experimental showings in the above listed references, disproving this concept of "sonoluminescence".

Again, there is no evidence to indicate applicant has so succeeded where others have failed, in arriving at an operative system that produces nuclear reactions by sonoluminescence, i.e., that he has progressed his system beyond the point of an unproven theory of concept which still requires an undue amount of experimentation to enable the artisan to make and use the invention for its indicated purpose.

It is thus considered that the examiner (for the reasons set forth above) has set forth a reasonable and sufficient basis for challenging the adequacy of the disclosure. The statute requires the applicant itself to inform, not to direct others to find out for themselves; In re Gardner et al, 166 U.S.P.Q. 138, In re Scarbrough, 182 U.S.P.Q. 298. Note that the disclosure must enable a person skilled in the art to practice the invention without having to design structure not shown to be readily available in the art; In re Hirsch, 131 U.S.P.Q. 198.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 22-25 and 27-33 are rejected under 35 U.S.C. 101 because the claimed invention as disclosed is inoperative and therefore lacks utility.

The reasons that the inventions as disclosed is inoperative are the same as the reasons set forth in section 4 above as to why the specification is objected to and the reasons set forth in section 4 above are accordingly incorporated herein.

There is no reputable evidence of record to indicate the invention has been reduced to the point of providing in current available form, an operative nuclear system (including one that generates nuclear fusion and reaction products). The invention is not considered as meeting the requirements of 35 U.S.C. 101 as being "useful". Note in this respect," Star in a Jar", Popular Science, 12/1998 which indicates that there is no convincing evidence that the phenomena attributed to sonoluminescence would produce useful sources of energy.

The applicant at best, has set forth what may be considered a concept or an object of scientific research. However, it has been held that such does not present a utility within the meaning of 35 U.S.C. 101. See Brenner v. Manson, 148 U.S.P.Q. 689.

Additionally, it is well established that where as here, the utility of the claimed invention is based upon allegations that border on the incredible or allegations that would not be readily accepted by a substantial portion of the scientific community, sufficient substantiating evidence of operability must be submitted by applicant. Note In

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re Houghton, 167 U.S.P.Q. 687 (CCPA 1970); In re Ferens, 163 U.S.P.Q. 609 (CCPA 1969); Puharich v. Brenner, 162 U.S.P.Q. 136 (CA DC 1969); In re Pottier, 152 U.S.P.Q. 407 (CCPA 1967); In re Ruskin, 148 U.S.P.Q. 221 (CCPA 1966); In re Citron, 139 U.S.P.Q. 516 (CCPA 1963); and In re Novak, 134 U.S.P.Q. 335 (CCPA 1962).

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 22-25 and 27-33 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The reasons that the inventions as disclosed are not enabling are the same as the reasons set forth in section 4 above as to why the specification is objected to and the reasons set forth in section 4 above are accordingly incorporated herein.

7. Claims 22-25 and 27-33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "portion" in claim 22 is a relative term which renders the claim indefinite. The term "portion" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Accordingly, the cavitation of the tensioned liquid with nuclear particles is indefinite.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 22, 23, 27 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by either one of Putterman et al. (U.S. 5,659,173) or Flynn (U.S. 4,333,796).

Either one of Putterman et al. or Flynn disclose a method for producing nuclear fusion using acoustical waves to cause implosion of a liquid containing hydrogen isotopes (e.g., see Abstract in Putterman or col. 1, lines 20+ in Flynn).

As to the claim limitation regarding nuclear particles cavitating the tensioned liquid, either one of Putterman et al. or Flynn inherently meets this limitation because their system includes nuclear particles such as deuterium or tritium that have not interacted with other particles and therefore inherently available for cavitation.

As to the tensioning of the liquid, either one of Putterman et al. or Flynn inherently meets this limitation because they apply acoustic waves to the working liquid that generates pressure and tensioning of the liquid.

9. Claims 24, 25 and 32 are rejected under 35 U.S.C. 102(b) as being anticipated by Putterman et al.

As to claim 24, see col. 1, lines 62+ or col. 22, lines 2+.

As to claim 25, see col. 2, lines 48+.

As to claim 32, see col. 13, lines 13+.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. References U1 and V1 further illustrate prior art.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rick Palabrica whose telephone number is 571-272-6880. The examiner can normally be reached on 6:30-5:00, Mon-Thurs.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RJP
September 21, 2005

A handwritten signature in black ink, appearing to read "R. Palabina". The signature is written in a cursive, flowing style.